NON-PUBLIC?: N
ACCESSION #: 9108230043
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Nine Mile Point Unit 1 PAGE: 1 OF 06

DOCKET NUMBER: 05000220

TITLE: Reactor Scram due to Neutron Monitoring Trip While Performing a Controlled Shutdown
EVENT DATE: 07/18/91 LER #: 91-008-00 REPORT DATE: 08/19/91

OTHER FACILITIES INVOLVED: N/A DOCKET NO: 05000

OPERATING MODE: N POWER LEVEL: 003

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
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Reactor Engineering NMP1

COMPONENT FAILURE DESCRIPTION:
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

On July 18, 1991, at 0840 hours, Nine mile Point Unit 1 (NMP1) experienced an unplanned reactor scram on Intermediate Range Monitoring System (IRM) HI HI while in the process of a controlled plant shutdown. At the time of the event, the mode switch was in STARTUP with reactor coolant pressure and temperature at approximately 893 pounds per square inch gauge (psig) and 529 degrees Fahrenheit (degrees F), respectively. The reactor was operating at approximately 3% of rated thermal power.

The reactor scram occurred while attempting to terminate an unanticipated reactor pressure decrease. Possible causes are: neutron flux spike due to pressure perturbations resulting from isolating an auxiliary steam load, or spurious spiking of the IRM neutron monitors due to induced noise.

Corrective actions have been taken to address the equipment deficiencies that contributed to the reactor pressure decrease and to improve the Operations response in such situations (generation of a Lessons Learned Transmittal and revision of operating procedures for isolating steam loads at low power).

END OF ABSTRACT

I. DESCRIPTION OF EVENT

On July 18, 1991, at 0840 hours, Nine Mile Point Unit 1 (NMP1) experienced an unplanned reactor scram on Intermediate Range Monitoring System (IRM) HI HI while in the process of a controlled plant shutdown. At the time of the event the mode switch was in STARTUP with reactor coolant pressure and temperature at approximately 893 pounds per square inch gauge (psig) and 529 degrees Fahrenheit (degrees F), respectively. The reactor was operating at approximately 3% of rated thermal power.

Ten (10) minutes before the scram, reactor pressure was at 942 psig with one turbine bypass valve (TBV 12I) indicating open; IRMs were on ranges 6 and 7 with reactor power slowly decreasing. At approximately 0831, the on-duty Chief Shift Operator (CSO) opened 02-03, Main Steam Line Drains to Condenser Blocking Valve from the reheater panel controls on N panel. Shortly thereafter, Operations personnel noticed that reactor pressure started decreasing (at about 5 psig/min.) along with reactor water level. Within the first two minutes of the start of the transient, an annunciator extinguished indicating that the Mechanical Pressure Regulator (MPR) was no longer controlling reactor pressure, and in fact, it appeared that the Electronic Pressure Regulator (EPR) was trying to take control. Initially, Operations personnel believed the MPR was the cause of the reactor pressure decrease that was taking place so the CSO directed his attention at restoring MPR control. At the same time the Reactor Operator (RO) at the F panel was monitoring Feedwater to ensure it was responding to the level decrease. This was verbally confirmed by both the RO at the F panel and by the RO at the E panel (reactor controls) who was monitoring a power increase that required him to range up on the IRMs. By 0836 the CSO had halted his troubleshooting efforts at the MPR controls after getting the MPR setpoint down to reactor pressure (at that time) and momentarily opening a turbine bypass valve. Reactor water level had started increasing by this time, however reactor pressure continued to decrease. After a short discussion, it was concluded that the pressure decrease was due to a combination of steam leakage and normal steam loads exceeding steam generation from the reactor. It was decided to close the 02-03 valve. While the motor operated valve was closing or immediately following its closure, a full reactor scram was received at 0840:44 with initial indication that it originated from the neutron monitoring system (IRM pens at chart recorders were observed spiking along with neutron monitoring scram annunciators). The neutron flux spike was too short in duration to initiate any computer points. IRM drawers 13 and 16 were found tripped (HI HI) at the G panel during the post scram recovery.

I. DESCRIPTION OF EVENT (cont.)

Immediately following the scram, Operations personnel implemented procedure N1-SOP-1, "Post Scram Recovery". All rods inserted normally and all systems responded as required. Minimum reactor level following the scram was approximately 64". High Pressure Coolant Injection (HPCI) was not required, as the #11 motor-driven Feedwater pump provided the required makeup to the vessel to respond to the level shrinkage. operations personnel proceeded with reactor cooldown until cold shutdown was reached later that day.

II. CAUSE OF EVENT

Due to the extremely short duration of the neutron monitoring spike, an immediate cause cannot be determined for this event. Therefore, two possible causes have been evaluated:

o Neutron flux spike as a result of a pressure wave or spike caused by closing drain valve 02-03

o Spurious IRM neutron monitors spiking as a result of external electrical activity or Electro Magnetic Interference (EMI).

The first possible cause would be a consequence of the unanticipated reactor cooldown rate (depressurization) initiated by opening the main steam line drains. The decision to open 02-03 by the CSO only added a steam load that is already normally present during the shutdown process. This points to the steam leakage present in the main steam system as a prim
ry precursor for this event. Prior to the plant shutdown, several steam leaks had been identified and scheduled for repair during the planned outage. In addition, steam leakage subsequently identified in the Drywell (i.e. 01-01 Main Steam Valve Isolation packing) may have contributed to the situation. The apparent impact of this leakage while shutting down could not be identified while at full power.

The decision to isolate main steam line drains (closing 02-03) was the operational response to address decreasing reactor pressure. Although no instrumented evidence of a pressure increase or spike was recorded as a result of the valve closing, operating experience at this plant and others has shown that removing auxiliary loads at this power level produces rapid pressure changes that can affect reactivity. Operating Procedure N1-OP-43, "Startup, Shutdown, and Normal Operation", contains a precaution warning of

II. CAUSE OF EVENT (cont.)

the consequences of taking auxiliary steam loads out of service when approaching Hot Standby from power operation. However, it may not provide adequate guidance for limiting pressure effects when removing auxiliary steam loads in this operating region.

A spurious spike induced in the neutron monitoring system cannot be ruled out as a cause considering the operating history of NMP1's IRMs and lack of any strong corroborating evidence for the first possible cause.

A contributing factor during the detection and initial assessment of this event was the open indication for TBV 12I, when it was actually closed. The position indication switch has a history of sticking.

III. ANALYSIS OF EVENT

This event is reportable in accordance with 10CFR50.73 (a) (2) (iv), "Any event or condition that resulted in manual or automatic actuation of any Engineered Safety Feature (ESF) including the Reactor Protection System (RPS)".

The plant trip and its associated response did not result in any safety limits being exceeded and the event posed no safety consequences or threat to the public health and welfare.

From a reactivity standpoint, the event occurred at very limiting initial conditions. When operating at rated temperature and pressure with low reactor power, changes in any reactor parameters can produce rapid changes in reactivity. This type of event would have had little effect on reactivity in the power operation region.

Reactor cooldown rate during the event averaged 48 F/hr before the scram and 74 F/hr following the scram, rates within the 100 F/hr cooldown rates prescribed by Technical Specifications. If the reactor depressurization (assume a reactor scram had not occurred) had resulted in an excessive cooldown rate and isolation of the steam line drains had not terminated or slowed the depressurization, Operations still had two options to terminate or slow the reactor depressurization: isolate the Main Steam Isolation Valves (MSIVs) and/or insert a manual scram. Isolation of the MSIVs would have probably resulted in a more pronounced neutron flux scram; however, due to the low reactor thermal power, the transient would have been well within the MSIV isolation transient described in the Unit 1 Final Safety Analysis Report (FSAR).

IV. CORRECTIVE ACTIONS

The following corrective actions have been taken by Operations:

1. A Lessons Learned Transmittal (91-78) was issued on 7/26/91 to inform all operating shifts about this event.

2. N1-OP-43, "Startup, Shutdown, and Normal Operation," will be revised by September 1991 to provide additional cautions and guidance when manipulating auxiliary steam loads at low reactor power during plant shutdown.

3. An Operator Aid has been posted in the control room concerning the TBV 12I position switch problem (valve may indicate open when actually closed) until the position switch can be replaced.

The following corrective actions have been taken to address equipment deficiencies associated with this event:

1. Steam leaks (identified prior to this event) present in the Main Steam system were repaired during the maintenance outage. These included replacement of main steam drain valves MS-100 and MS-102 (WRs 188090/188079), steam seal piping repairs (192078/ 192881), and repairs to reheat valve 08-30 (185339).

2. A Work Request (188203) has been initiated to replace the position switch for TBV 12I at the next outage.

Niagara Mohawk is actively processing corrective actions to address the IRM neutron monitoring noise and signal path spiking problems. For example, by June 1991 all Source Range Neutron Monitoring (SRM) and IRM preamplifiers have had insulating washers installed. This has resulted in a significant EMI reduction on the SRM's and IRM's during the plant startup following the maintenance outage. LER 91- 03 provides a comprehensive list of completed and planned activities.

V. ADDITIONAL INFORMATION

A. Failed components: none.

B. Previous similar events: NMP1 has experienced reactor scrams due to spurious spiking of neutron monitors. corrective actions and previous similar events for this problem can be found in LER 91-03.

V. ADDITIONAL INFORMATION (cont.)

C. Identification of components referred to in this LER:

COMPONENT	IEEE 803 FUNCTION	IEEE 805 SYSTEM
Reactor Protection System	N/A	JC
Intermediate Range Monitor	JI	IG
TBV Position Switch	33	JI
Main Steam Drain Valve	LOV	SB

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Joseph F. Firlit
Vice President
Nuclear Generation NMP80595

August 19, 1991

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

RE: Docket No. 50-220
LER 91-08

Gentlemen:

In accordance with 10CFR50.73, we hereby submit the following Licensee Event Report:

LER 91-08 Which is being submitted in accordance with 10CFR50.73 (a) (2) (iv), "Any event or condition that resulted in manual or automatic actuation of any Engineered Safety Feature, including the Reactor Protection System."

This report was completed in the format designated in NUREG-1022, Supplement 2, dated September 1985.

Very truly yours,

Joseph F. Firlit
Vice President - Nuclear Generation

JFF/AC/lmc
ATTACHMENT

xc: Thomas T. Martin, Regional Administrator Region I
William A. Cook, Sr. Resident Inspector

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